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| 09/909,003      | 07/19/2001  | Henry A. Pfeffer     | FMCP-090US3         | 9320             |

7590 04/08/2003  
Patent Administrator  
FMC Corporation  
1735 Market Street  
Philadelphia, PA 19103

EXAMINER

NAFF, DAVID M

| ART UNIT | PAPER NUMBER |
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1651

DATE MAILED: 04/08/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/509 003

Applicant(s)

Pfeiffer et al

Examiner

N. J. J.

Group Art Unit

1257

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

## Status

- ☒ Responsive to communication(s) filed on 1/8/03
- ☒ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

## Disposition of Claims

- ☒ Claim(s) 1-34 is/are pending in the application.
- ☐ Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1-34 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
  - ☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been received.
  - ☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_
  - ☐ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

\*Certified copies not received: \_\_\_\_\_

## Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_
- ☐ Interview Summary, PTO-413
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other \_\_\_\_\_

Office Action Summary

The amendment of 1/8/03 amended the specification and claims 9, 20 and 27.

Claims examined on the merits are 1-34 which are all claims in the application.

5       The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

Claims 1-8 and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas et al (5,662,840) in view of Hartmeier  
10 (4,182,655) and Haruta et al (4,975,375) for the type of reasons set forth in the previous office action of 9/3/02.

Claims 1-8 are drawn to hydrocolloid gel beads of average particle size of about 5-150 microns in diameter containing an immobilized enzyme, and claims 20-26 are drawn to hydrocolloid gel beads containing an  
15 immobilized enzyme prepared by forming dehydrated hydrocolloid gel beads having a diameter of 5 to 150 microns, and imbibing into the beads an aqueous enzyme solution.

Thomas et al disclose producing hydrocolloid gel beads having a diameter of less than 50 microns that may be used as a carrier for an  
20 enzyme (col 1, lines 22-31, and col 4, line 27). The beads have the property of flowing over each other as water (col 6, lines 48-51).

Hartmeier discloses enzyme immobilization by contacting dried protein gel particles of 50 to 100 microns in size with an aqueous enzyme solution and allowing the particles to swell and suck up the enzyme

solution to obtain the immobilized enzyme. For example, see example 1 and claim 1.

Haruta et al disclose enzyme immobilization by swelling a polymer gel in a solution of enzyme to absorb and immobilize the enzyme in the gel (col 4, line 27, and col 5, lines 5-10).

When using the gel beads of Thomas et al as a carrier for an enzyme, it would have been obvious to provide the enzyme in the beads by drying the beads and allowing the beads to rehydrate and swell in an aqueous enzyme solution so the enzyme solution is absorbed into the beads and the enzyme is immobilized therein as suggested by Hartmeier and Haruta et al carrying out enzyme immobilization by rehydrating a dried gel in an aqueous enzyme solution to absorb the solution into the gel as the gel rehydrates.

#### ***Response to Arguments***

Applicants urge that Thomas et al heat a sol containing the enzyme to at least 90°C, and that it is known that heat can deactivate an enzyme. However, this inactivating of the enzyme would have been a suggestion to use the alternative method of absorbing an enzyme solution into dry beads as suggested by the secondary references.

While Hartmeier may crosslink, crosslinking is not until after an enzyme solution has been sucked up into the dry crosslinked protein. The present claims do not exclude crosslinking after the enzyme is absorbed into the beads.

While Haruta et al may not use a polymer other than a hydrocolloid when reversibly swelling and shrinking of a polymer by a change in

temperature, the use of a hydrocolloid would have been suggested by Thomas et al. The rejection is not based on reversibly swelling and shrinking the hydrocolloid but on drying the hydrocolloid and allowing it to imbibe an enzyme solution when rehydrating and swelling. The  
5 references must be considered in combination as a whole.

***Claim Rejections - 35 USC § 103***

Claims 9-19 and 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-8 and 20-26 above, and further in view of Cambou et al (document 14 on form PTO-1449)  
10 or Kazandjian et al (document 15), and if necessary in further view of Zaks et al (listed on form PTO-892).

The claims require using the enzyme-containing beads set forth above in a chemical transformation wherein the beads and a reaction substrate are contacted in the presence of a non-aqueous solvent to convert the  
15 substrate to a product.

Cambou et al (page 2688, left col, paragraph above "Results and Discussion") and Kazandjian et al (page 5448, right col, lines 9-14 of first full paragraph) disclose converting a substrate to a product with an immobilized enzyme in an organic medium.

20 When preparing enzyme-containing beads as set forth above, it would have been obvious to use the beads to convert a substrate to a product in an organic medium as suggested by Cambou et al or Kazandjian et al performing enzymatic catalysis in an organic medium with an immobilized enzyme. Using the beads for enzymatic catalysis in an organic medium  
25 would have been expected to provide the same type of result as obtained

by Cambou et al or Kazandjian et al when carrying out enzymatic catalysis in an organic medium. Zaks et al further disclose enzymatic catalysis in an organic medium, and if needed would have further suggested enzymatic catalysis in an organic medium.

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### ***Response to Arguments***

The response to arguments set forth above also applies to this rejection since a *prima facie* case has been made in the rejection of claims 1-8 and 20-26 above.

### ***Double Patenting***

10 Claims 1-34 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. 6,268,191. Although the conflicting claims are not identical, they are not patentably distinct from each other because the present claims drawn to gel beads and methods as described above would  
15 have been obvious from the claims of the patent that are drawn to enzyme-containing hydrocolloid gel beads of about 5-150 microns in diameter, and to preparing the beads by imbibing an aqueous enzyme solution into dehydrated hydrocolloid gel beads of about 5-150 microns in diameter.

### ***Reissue Applications***

20 Applicants state that a terminal disclaimer will be considered when patentable subject matter is indicated.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set  
25 to expire THREE MONTHS from the mailing date of this action. In the

event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

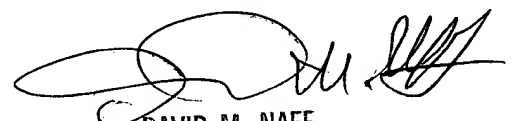
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff whose telephone number is (703) 308-0520. The examiner can normally be reached on Monday-Thursday and every other Friday from about 8:30 AM to about 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, a message can be left on voice mail.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn, can be reached at telephone number (703) 308-4743.

The fax phone number is (703) 872-9306 before final rejection or (703) 872-9307 after final rejection.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

  
DAVID M. NAFF  
PRIMARY EXAMINER  
ART UNIT 1651